

TV-Tuner-IC with Three Separate Oscillators and Mixers, SAW Driver, L.O.-Output and Tri-State-Band Switch

Features:

- 9 V supply voltage
 - Frequency range from 48 to 860 MHz
 - Band A: balanced high impedance mixer input and amplitude controlled oscillator
 - Band B + C: balanced low impedance mixer input and symmetrical oscillator
 - Balanced L.O.-output for prescalers or PLL
 - SAW filter driver with low impedance output
 - Voltage regulator for stable operating characteristics
 - ESD protection on all pins except oscillator pins and RF-inputs
- Package: SSO28**

Block Diagram

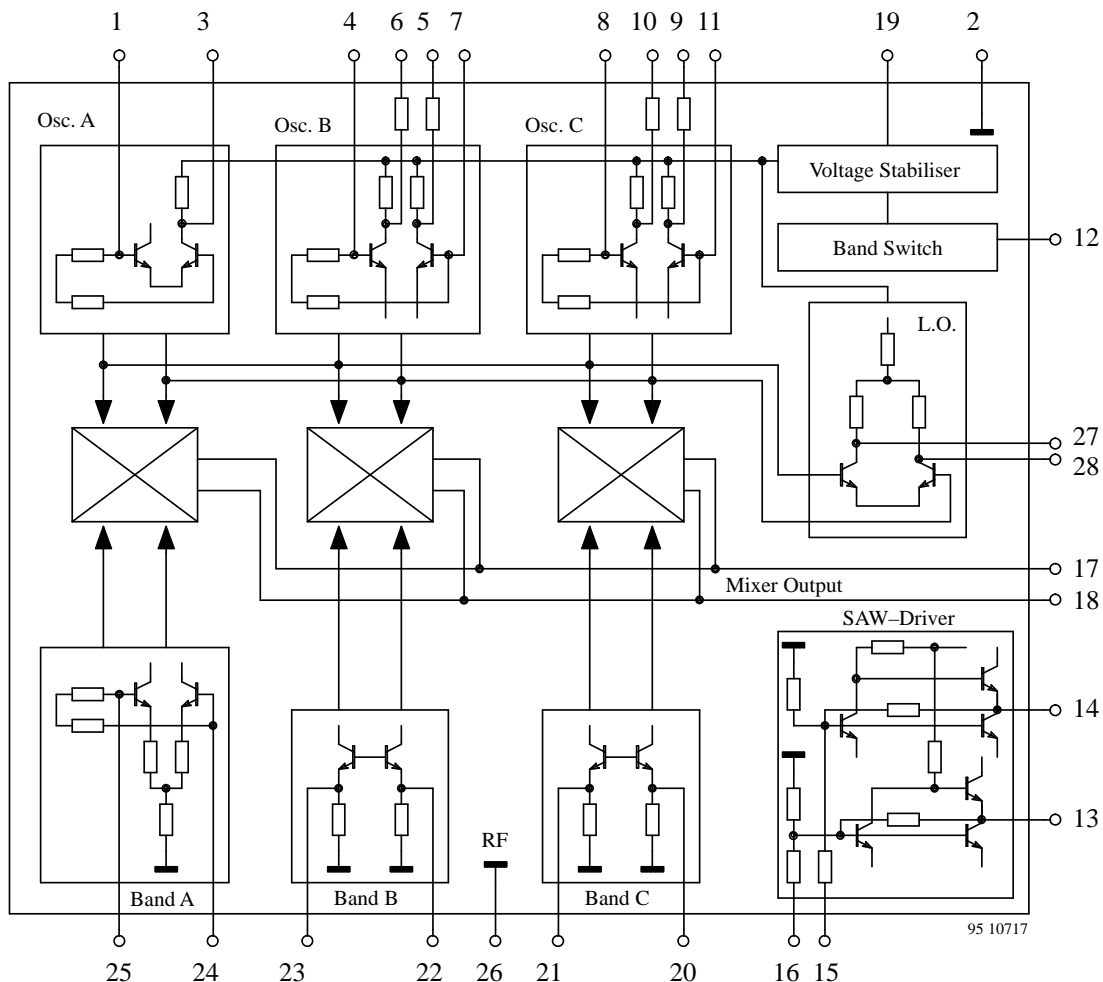
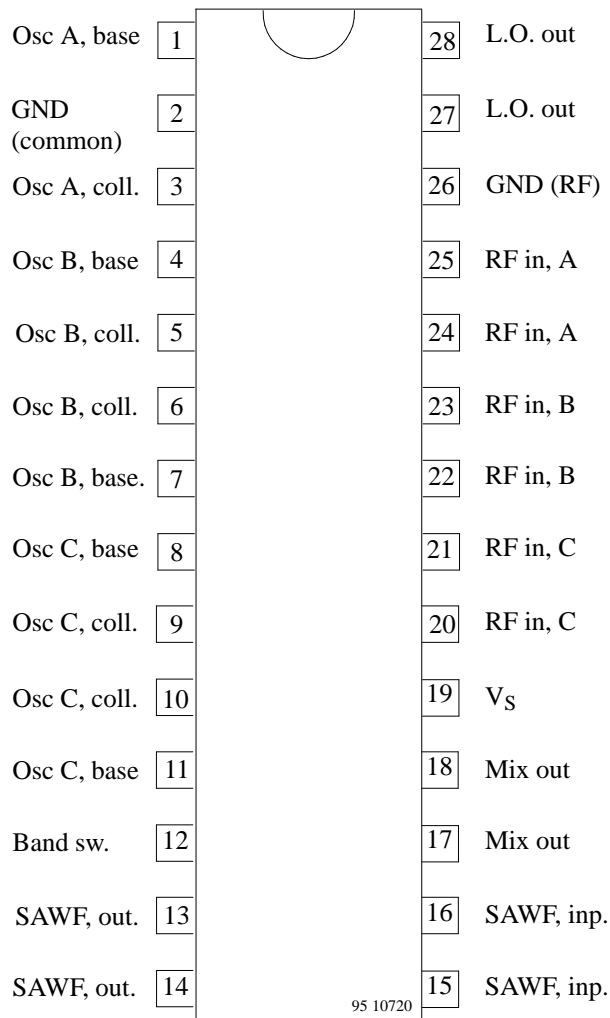


Figure 1. Block diagram pinning of U2309B

Pin Configuration



Pin	Symbol	Function
1	Osc A,base	Oscillator Band A, base
2	GND (common)	Ground, common
3	Osc A, coll.	Oscillator band A, collector
4,7	Osc B, base	Oscillator band B, bases
5,6	Osc B, coll	Oscillator band B, collectors
8,11	Osc C, base	Oscillator band C, bases
9,10	Osc C, coll.	Oscillator band C, collectors
12	Band sw.	Tri – state band switch
13,14	SAWF, out.	SAW filter driver outputs
15,16	SAWF, inp.	SAW filter driver inputs
17,18	Mix out	Mixer outputs, open collector
19	V _S	Supply voltage V _S
20,21	RF in, C	RF inputs, band C
22,23	RF in, B	RF inputs, band B
24,25	RF in, A	RF inputs, band A
26	GND (RF)	Ground, RF part
27,28	L.O. out	L.O. outputs

Absolute Maximum Ratings

All voltages are referred to GND, Pin 2

Parameters	Symbol	Min.	Typ.	Max.	Unit
Supply voltage Pin 19	V _s			10.5	V
RF inputs Pin 20–25				5.0	V
IF outputs Pin 17–18				10.5	V
Tri – state switch voltage Pin 12	V _{iTRI}			10.5	V
Junction temperature	T _j			150	C
Storage temperature	T _{stg}	-40		150	C

Operating Range

All voltages are referred to GND, Pin 2

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	Pins 17–19	V _s	8,1	9,0	9,9	V
Ambient temperature		T _{amb}	-25		75	C
Thermal resistance	SSO–28	R _{thja}		128		K/W

Electrical Characteristics

Test Conditions (unless otherwise specified) : $V_s = 9\text{ V}$. $T_{amb} = 25\text{ C}$. Reference point Pin 2 (Pin 26). Pin numbers in brackets for the mirrored version. Referred to test circuit page 6.

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	Pins 17–19	V_s	8.1	9.0	9.9	V
Supply current	Pins 17–19	I_s		42	50	mA
Band switch						
Voltage Band A	Pin 12	VSWA	0	0	1.0	V
Voltage Band B	Pin 12	VSWB	1.6	2.0	2.4	V
Voltage Band C	Pin 12	VSWC	3.4	4.0	5.0	V
Switching current	VSW = 5 V12	ISW			100	uA
L.O. – Output						
L. O. Level each output	RL = 50 Ohm27,28	PLO	–25		–17	dBm
SAW filter driver	$f_i = 36\text{ MHz}$					
Input impedance	Pins 15,16	Z_{iSAW}		450		Ohm
Output impedance	Pins 13,14	Z_{oSAW}		70		Ohm
Voltage gain	Pins 15,16 13,14	G_{vSAW}		17		dB
Band A						
Input frequency range	Pin 24	f_{iA}	48		170	MHz
Input impedance	Figure 3. Pin 24	S11A				
Gain (note 4)	I/P to O/P	GA		28		dB
Noise figure DSB (note 2)	$f_{iA} = 50\text{ MHz}$ $f_{iA} = 150\text{ MHz}$ I/P to O/P	NF		11,5 12		dB dB
Input level for (note 3)	Each carrier					
IM3 (Interm. of 3rd order)	$f_{iA} = 71\text{ MHz}$ I/P	V_{iA}		– 3		dBm
IM2 (Interm. of 2nd order)	$f_{iA} = 71\text{ MHz}$ I/P	V_{iA}		–22		dBm
Band B (note 1)						
Input frequency range	Pins 22,23	f_{iB}	170		470	MHz
Input impedance	Figure 3. Pins 22,23	S11B				
Gain (note 4)	I/P to O/P	GB		32		dB
Noise figure DSB (note 2)	$f_{iB} = 200\text{ MHz}$ $f_{iB} = 450\text{ MHz}$ I/P to O/P	NF		9,5 10		dB dB
Input level for (note 3)	Each carrier					
IM3 (Interm. of 3rd order)	$f_{iA} = 300\text{ MHz}$ I/P	V_{iB}		–28		dBm
Band C (note 1)						
Input frequency range	Pins 20,21	f_{iC}	470		860	MHz
Input impedance	Figure 3, Pins.20,21	S11C				
Gain	I/P to O/P	GC		32		dB
Noise figure DSB (note 2)	$f_{iB} = 500\text{ MHz}$ $f_{iB} = 800\text{ MHz}$ I/P to O/P	NF		10,5 11,5		dB dB
Input level for (note 3) :	Each carrier					
IM3 (Interm. of 3rd order)	$f_{iA} = 600\text{ MHz}$ I/P	V_{iC}		–28		dBm

PCB for the R_{thJA} -Measurement

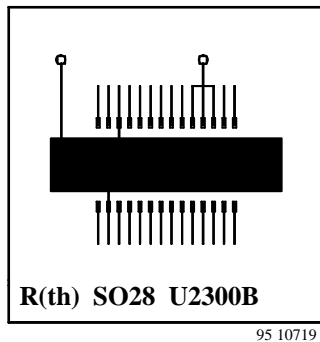


Figure 3. Figure 2: PCB for the R_{thJA} – measurement:
35 μ m one-sided Cu-Coated epoxy PCB 40 x 40 x 1.5 mm

Input Impedance Mixer Band A (S11A), Band C (S11B/C)

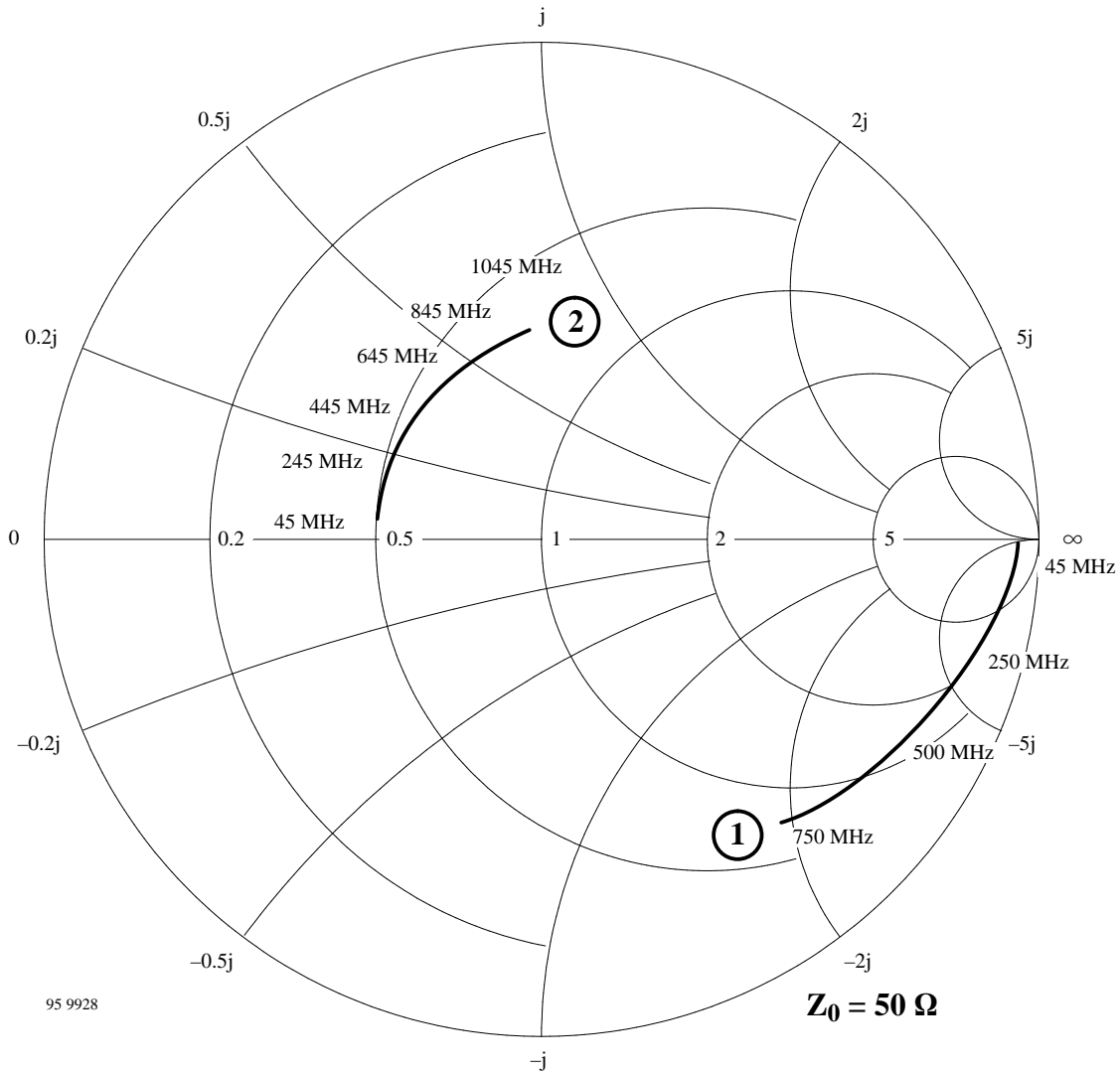
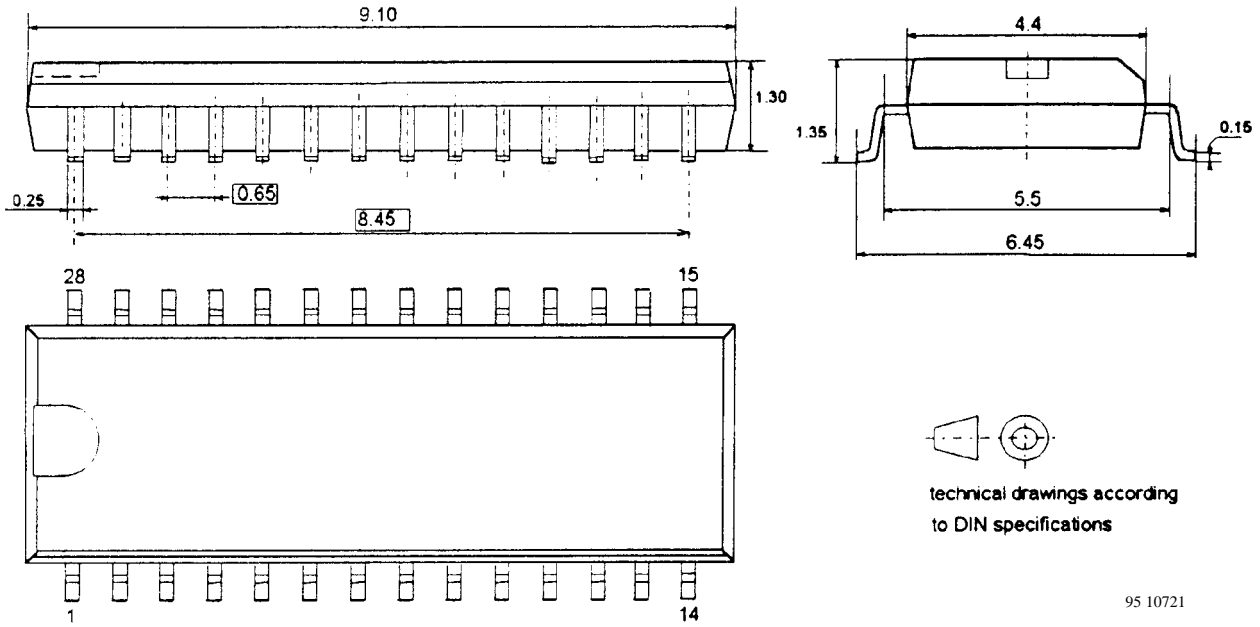


Figure 4. INPUT IMPEDANCE MIXER BAND A (S11A), B AND C (S11B/C)

- 1) **VHF – Low**
Normalised to 50 Ohm, measuring range 45 MHz to 750 MHz.
- 2) **VHF – High and UHF**
Normalised to 50 Ω , measuring range 45 MHz to 1045 MHz. Both inputs are driven symmetrical.
The output impedance of the hybrid is 100 Ω , the measured levels are then calculated in reference to 50 Ω .

Dimensions in mm:

Package: SSO28



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2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

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1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

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